

WE CLAIM:

1. A process of preparing a chemical toner comprising:

(a) mixing together a latex and a first composition to result in a second composition, wherein the first composition includes a colorant dispersion and an optional wax dispersion, wherein the latex comprises polymeric particles dispersed in an aqueous phase, wherein the polymeric particles comprise a compound with a functional group covalently bound and with the functional group disposed on the particle surface, wherein the compound exhibits a molecular weight polydispersity of from about 1.1 to about 3.0;

(b) heating the second composition at an aggregation temperature which is at or below the glass transition temperature of the polymeric particles to form toner sized aggregates;

(c) adding a coagulant to the second composition prior to or during the heating of the second composition at the aggregation temperature to promote formation of the toner sized aggregates;

(d) stabilizing the particle size of the toner sized aggregates, resulting in a stabilized composition; and

(e) heating the stabilized composition at a coalescence temperature which is above the glass transition temperature of the polymeric particles to coalesce the toner sized aggregates into toner particles.

2. The process of claim 1, further comprising: isolating the toner particles.

3. The process of claim 1, wherein the stabilizing the particle size of the toner sized aggregates is accomplished by adding an ionic surfactant prior to the heating the stabilized composition at the coalescence temperature.

4. The process of claim 1, wherein the stabilizing the particle size of the toner sized aggregates is accomplished by changing the pH of the second composition prior to the heating the stabilized composition at the coalescence temperature.

5. The process of claim 1, wherein the heating the stabilized composition at the coalescence temperature is conducted for a time period ranging from about 1 to about 6 hours.

6. The process of claim 1, wherein the aggregation temperature ranges from about 1 to about 20 degrees C below the glass transition temperature.

7. The process of claim 1, wherein the coalescence temperature ranges from about 3 to about 60 degrees C above the glass transition temperature.

8. The process of claim 1, wherein the aggregation temperature is from about 29°C to about 49°C, and wherein the coalescence temperature is from about 70°C to about 130°C.

9. The process of claim 1, wherein the toner particles exhibit a geometric standard deviation of about 1.25 or less prior to any optional classification of the toner particles.

10. The process of claim 1, wherein the toner particles exhibit a geometric standard deviation ranging from about 1.18 to about 1.25 prior to any optional classification of the toner particles.

11. The process of claim 1, wherein the toner particles exhibit a geometric standard deviation ranging from about 1.23 to about 1.25 prior to any optional classification of the toner particles.

12. The process of claim 1, wherein the compound exhibits a molecular weight polydispersity of from about 1.1 to about 2.0.

13. The process of claim 1, wherein the compound exhibits a molecular weight polydispersity of from about 1.05 to about 1.45.

14. The process of claim 1, wherein the coagulant is a polymetal halide.

15. The process of claim 1, wherein the coagulant is selected from the group consisting of polyaluminum chloride, polyaluminum sulfo silicate, aluminum sulfate, zinc sulfate, magnesium sulfate, and mixtures thereof.

16. The process of claim 1, wherein the coagulant is a cationic surfactant selected from the group consisting of: alkylbenzyl dimethyl ammonium chloride, dialkyl benzenealkyl ammonium chloride, lauryl trimethyl ammonium chloride, alkylbenzyl methyl ammonium chloride, alkyl benzyl dimethyl ammonium bromide, benzalkonium chloride, cetyl pyridinium bromide, C₁₂, C₁₅, C₁₇ trimethyl ammonium bromides, halide salts of quaternized polyoxyethylalkylamines, dodecylbenzyl triethyl ammonium chloride, and mixtures thereof.

17. The process of claim 1, wherein the polymeric particles have a glass transition temperature ranging from about 45° C to about 80° C.

18. The process of claim 1, wherein the compound is polymerized from a single monomer or a mixture of different monomers, wherein the single monomer and the mixture of different monomers are selected from the group consisting of:

- (a) an acrylic acid and its derivatives of the formula $(CH_2=CH)COOR-COOH$;
- (b) a maleic acid and its derivatives of the formula R',R''-maleicacid;
- (c) a styrenic monomer;
- (d) a methacrylic acid and its derivatives of the formula $(CH_2=CCH_3)COORCOOH$; and
- (e) a diene,

wherein R is an aliphatic group and wherein one of R' and R'' is an aromatic group and the other is the aliphatic group, or R' and R'' are the same or different aromatic group, or R' and R'' are the same or different aliphatic group.

19. The process of claim 1, wherein the wax dispersion includes a wax which is a polyethylene or a polypropylene.

20. The process of claim 1, further comprising: adding a second portion of the latex to form a shell on the toner sized aggregates.

21. The process of claim 1, further comprising: adding a different latex to form a shell on the toner sized aggregates, wherein the different latex comprises a different compound with the same or different functional group as the compound.

22. The process of claim 1, wherein the compound is selected from the group consisting of: poly(styrene-alkyl acrylate), poly(styrene-1,3-diene), poly(styrene-alkyl

methacrylate), poly(alkyl methacrylate-alkyl acrylate), poly(alkyl methacrylate-aryl acrylate), poly(aryl methacrylate-alkyl acrylate), poly(alkyl methacrylate), poly(styrene-alkyl acrylate-acrylonitrile), poly(styrene-1,3-diene-acrylonitrile), poly(alkyl acrylate-acrylonitrile), poly(styrene-butadiene), poly(methylstyrene-butadiene), poly(methyl methacrylate-butadiene), poly(ethyl methacrylate-butadiene), poly(propyl methacrylate-butadiene), poly(butyl methacrylate-butadiene), poly(methyl acrylate-butadiene), poly(ethyl acrylate-butadiene), poly(propyl acrylate-butadiene), poly(butyl acrylate-butadiene), poly(styrene-isoprene), poly(methylstyrene-isoprene), poly(methyl methacrylate-isoprene), poly(ethyl methacrylate-isoprene), poly(propyl methacrylate-isoprene), poly(butyl methacrylate-isoprene), poly(methyl acrylate-isoprene), poly(ethyl acrylate-isoprene), poly(propyl acrylate-isoprene), poly(butyl acrylate-isoprene); poly(styrene-propyl acrylate), poly(styrene-butyl acrylate), poly(styrene-butadiene-acrylonitrile), and poly(styrene-butyl acrylate-acrylonitrile).

23. The process of claim 1, wherein the compound is polymerized from a carboxylic acid selected from the group consisting of acrylic acid, methacrylic acid, itaconic acid, beta carboxy ethyl acrylate, fumaric acid, maleic acid, cinnamic acid, and mixtures thereof.

24. A chemical toner comprising:

(a) a resin including a compound which exhibits a molecular weight polydispersity of from about 1.1 to about 3.0;

(b) an optional wax; and

(c) a colorant,

wherein the particle size of the chemical toner exhibits a geometric standard deviation of about 1.25 or less.

25. The chemical toner of claim 24, wherein the geometric standard deviation ranges from about 1.18 to about 1.25.

26. The chemical toner of claim 24, wherein the geometric standard deviation ranges from about 1.23 to about 1.25.

27. The chemical toner of claim 24, wherein the compound exhibits a molecular weight polydispersity of from about 1.1 to about 2.0.

28. The chemical toner of claim 24, wherein the compound exhibits a molecular weight polydispersity of from about 1.05 to about 1.45.

29. The chemical toner of claim 24, wherein the resin is present in an amount of from about 65 to about 97 weight percent, the wax is present in an amount of from 0 to about 15 weight percent, and the colorant is present in the amount of 3 to about 15 weight percent based on the toner.